US Army Corps of Engineers®
Engineer Research and Development Center

Product

Rapid Soils Analysis Kit

Technology

The Rapid Soils Analysis Kit (RSAK), developed under the Joint Rapid Airfield Construction program (JRAC), addresses the need for rapid onsite soil characterization, providing both soil classification and construction design parameters in 1 hr. The soils kit includes a small-scale field laboratory consisting of a microwave, electric balance, sieve shaker, sieves, grinder, plastic limit tool and necessary bowls, spatulas, and scoops. From a small soil sample (~300 g), these instruments determine soil moisture, grain size distribution (GSD), and plastic limit (PL). The numerical data generated from these soils tests are input directly into regression software that determines soil classification. With the soil classification, PL, and GSD, the software uses multiple-linear regression based upon worldwide soil property databases to estimate optimum water content and maximum dry density. Built-in higher order regression equations compute complete design curves for Proctor density, as-built California Bearing Ratio (CBR), and soaked CBR for the constructed condition of the soil of interest.

Rapid Soils Analysis Kit, or RSAK

Problem

An accurate and expedient means to determine soil classification is essential to establish the soil design criteria for contingency airfield and lines of communication construction using in situ soil. Under a contingency design and construction scenario, only a few hours are available to accumulate necessary ground truth data. Currently, only subjective field analysis techniques are available, whose results fail to provide tangible numerical data that can be used to establish the necessary construction criteria.

Expected Cost To Implement

The RSAK is presently available either as an included system on the RAVEN (RApid Vehicle ENgineer) or as a stand-alone kit shipped in two large Pelican cases (model 1660). All components of the stand-alone kit are available from commercial vendors at a Government cost of approximately $5,000 as of 24 Aug 2006 (*training and assembly not included*).

Benefits/Savings

The RSAK dramatically reduces the logistics of performing in-theater soils analyses. The RSAK is easily transported as a two-man carry, can be used in forward operations, onsite, with a setup time of only a few minutes. A traditional soil laboratory must be stationed at a rear operating base, with the complication of transporting collected field samples to be sent back for analysis requiring days of testing versus 1 hr with the RSAK. Microwave drying enables rapid in situ moisture content determination without the need for nuclear test devices.

ERDC POC(s)

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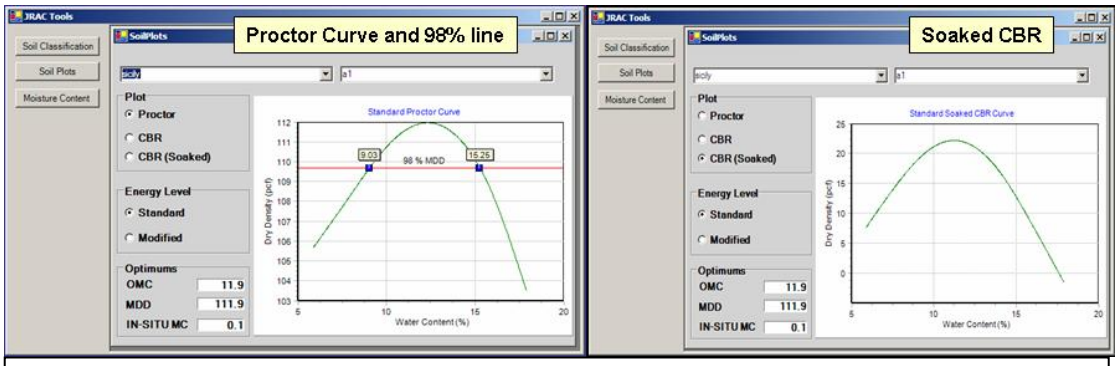
Distribution Sources

Software is available from ERDC by contacting the ERDC POC. Hardware is commercially available from worldwide soil equipment distributors. A detailed equipment list is available in the soils kit documentation.



Output from RSAK software showing moisture-density and CBR strength curves

Available Documentation

Operating information for performing a soils analysis is included in documentation with the soils kit. An ERDC report detailing the kit will be available in spring 2007.

Available Training

Current training requires a 4-hr time block with a technical engineer (21 Tango). A training video detailing the soils kit will be available in spring 2007 as part of the JRAC Software Suite.

Available Support

Please contact the ERDC POC or visit the JRAC Web site for the latest updates, training videos, and documentation.

A training video on use of RSAK is in production and is expected to be distributed in spring 2007. Currently, a 4-hr time block with a technical engineer is required.